EQUATIONS OF LINES

Slope Intercept form/   Point-Slope / Standard form

22.6) Chris does a lot of babysitting. When parents drop off their children and Chris can supervise them at home, the hourly rate is $3. If Chris has to travel to the child's home, there is a fixed charge of 45 for transportation, in addition to the $3 hourly rate.
   a) Graph $y = 3x$ and $y = 3x + 5$. What do these lines have to do with the babysitting context? What feature do they have in common? How do they differ?
   b) Predict what the graph of $y = 3x + 6$ will look like. What change in the babysitting context does this line suggest?

23.5) Drivers in distress near Exeter have two towing services to choose from: Brook's Body Shop charges $3 per mile for the towing, and a fixed $25 charge regardless of the length of the tow. Morgan Motors charges a flat $5 per mile. One the same system of axes, represent each of these choices by a linear graph that plots the cost of the tow versus the length of the tow. If you needed to be towed, which service would you call and why?

23.6) Predict what the graph of
   a) $y = 2x + 5$
   b) $y = 3x + 5$
   will look like. In each case, confirm your prediction on the calculator, and describe a context from which the equation might emerge.
   c) Linear equations that look like $y = mx + b$ are said to be in *slope-intercept* form. Explain. The terminology refers to which of the two intercepts?

26.4 Avery's long distance phone company charges a connect fee in addition to a per minute charge for each call. Avery's most recent bill included a $4.24 charge for a 12 minute call and a $6.00 charge for a 20 minute call.
   a) What is the per-minute charge?
   b) What is the connect fee?
   c) How much would Avery be billed for a five-minute call?
   d) How much would Avery be charged for a call m minutes long?
   e) Avery was able to figure out answers to (a) and (b) without doing any algebra. How?

26.5(continuation) I was recently called by a telemarketer asking me to change my long-distance phone company. This new company charges $0.33 per minute with no connect fee. Is this a better deal than the company described in the previous problem?

26.7 The point (3,2) is on the line $y = 2x + b$. Find the value of b. Graph the line.

26.8 Are (2,9) and (-3,-6) both on the line $y = 4x + 6$? If not, find an equation for the line that does pass through both points.

26.9 After you graph the line $y = 4x + 6$, find
   a) the y-coordinate of the point on the line whose x-coordinate is 2;
   b) the x-coordinate of the point on the line whose y-coordinate is 2.

27.6 A toy manufacturer is going to produce a new toy car. Each one costs $3 to make, and the company will also have to spend 4200 to set up the machinery to make them.
   a) What will it cost to produce the first hundred cars? The first n cars?
   b) The company sells the cars for $4 each. Thus the company takes in $400 by selling one hundred cars. How much money does the company take in by selling n cars?
   c) How many cars does the company need to make and sell in order to make a profit?

27.9 Let $P = (x,y)$ and $Q = (1,5)$. Write an equation that states that the slope of the line PQ is 3. Show how this slope equation can be rewritten in the form $y - 5 = 3(x - 1)$. This linear equation is said to be in *point-slope form*. Explain the terminology. Find the coordinates for three different points P that fit this equation.

27.10 (continuation) What do the lines $y = 3(x - 1) + 5$, $y = 2(x - 1) + 5$, and $y = -(1/2)(x - 1) + 5$ all have in common? How do they differ from each other?

28.4 Write an equation for the line that goes through the point (1,5) and that has slope 2/3.

28.5 Write an equation for the line that contains the points in the table, and make up a context for it.

X	0	15	30	45	60
Y	100	160	220	280	340

28.11 To graph linear equations such as $3x + 5y = 30$, one can put the equation into slope-intercept form, but (unless the slope is needed) it is easier to find the x- and y- intercepts and use them to sketch the graph. Find the axis intercepts of each of the following and use them to draw the given line. An equation $ax + by = c$ is said to be in *standard form*.
   a) $20x + 50y = 1000$ b) $4x - 3y = 72$

28.12 Find an equation for the line containing the points (-3,0) and (0,4).

29.1 Write an equation in point-slope form for
   a) the line that goes through (2,5) and (6,-3)
   b) the line that goes through point (h,k) and that has slope m.

29.2 Casey goes for a bike ride from Exeter to Durham, while an odometer keeps a cumulative record of the number of miles traveled. The equation $m = 12t + 37$ describes the odometer reading m after t hours of riding. What is the meaning of 12 and 37 in the context of this trip?

29.3 Find an equation for the line that passes through the points (4.1, 3.2) and (2.3, 1.6).

29.6 As you know, temperatures can be measured by either Celsius or Fahrenheit units; 30°C us equivalent to 86°F, 5°C is equivalent to 41°F, and -10°C is equivalent to 14°F.
   a) Plot this data with C on the horizontal axis and F on the vertical axis.
   b) Verify that these three points are collinear.
   c) Find a linear equation that relates C and F.